Esercizio 3.11

Calcolo le quantità legate alla sezione.

$$W_{xx} = W_{yy} = \frac{\pi}{32} \cdot \alpha^3 l^3 \cdot \left[1 - \left(\frac{\alpha^2 l}{\alpha l}\right)^4\right] = \frac{\pi}{32} \cdot \alpha^3 l^3 \cdot \left[1 - \alpha^4\right]$$

$$W_P = \frac{\pi}{16} \cdot \alpha^3 l^3 \cdot \left[1 - \alpha^4\right]$$

$$A = \frac{\pi}{4}\left(\alpha^2 l^2 - \alpha^4 l^2\right) = \frac{\pi}{4} \cdot l^2 \cdot \alpha^2 \left(1 - \alpha^2\right)$$

Calcolo $M_{f_{xx}}$, $M_{f_{yy}}$ e le varie σ_f.

$$|M_{f_{xx}}| = |F \cdot \lambda l|$$

$$|M_{f_{yy}}| = |F \cdot \lambda l|$$

$$\sigma_{f_A} = -\frac{|M_{f_{xx}}|}{W_{xx}} = \frac{-F \cdot \lambda l}{W_{xx}}$$

$$\sigma_{f_B} = +\frac{|M_{f_{yy}}|}{W_{yy}} = \frac{+F \cdot \lambda l}{W_{yy}}$$

$$\sigma_{f_C} = +\frac{|M_{f_{xx}}|}{W_{xx}} = +\frac{F \cdot \lambda l}{W_{xx}}$$

Calcolo T e le varie τ_T. Ho 2 tagli in direzioni diverse.

$|T_{xx}| = |F|$ casualmente hanno la stessa entità

$|T_{yy}| = |F|$

$$|\tau_{TA}| = \frac{|T_{yy}|}{A} \cdot \frac{4}{3} \cdot \left(1 + \frac{1}{\alpha + \frac{1}{\alpha}}\right) = \frac{F}{A} \cdot \frac{4}{3}\left(1 + \frac{1}{\alpha + \frac{1}{\alpha}}\right)$$

$$|\tau_{TB}| = \frac{|T_{xx}|}{A} \cdot \frac{4}{3}\left(1 + \frac{1}{\alpha + \frac{1}{\alpha}}\right) = \frac{F}{A} \cdot \frac{4}{3}\left(1 + \frac{1}{\alpha + \frac{1}{\alpha}}\right)$$

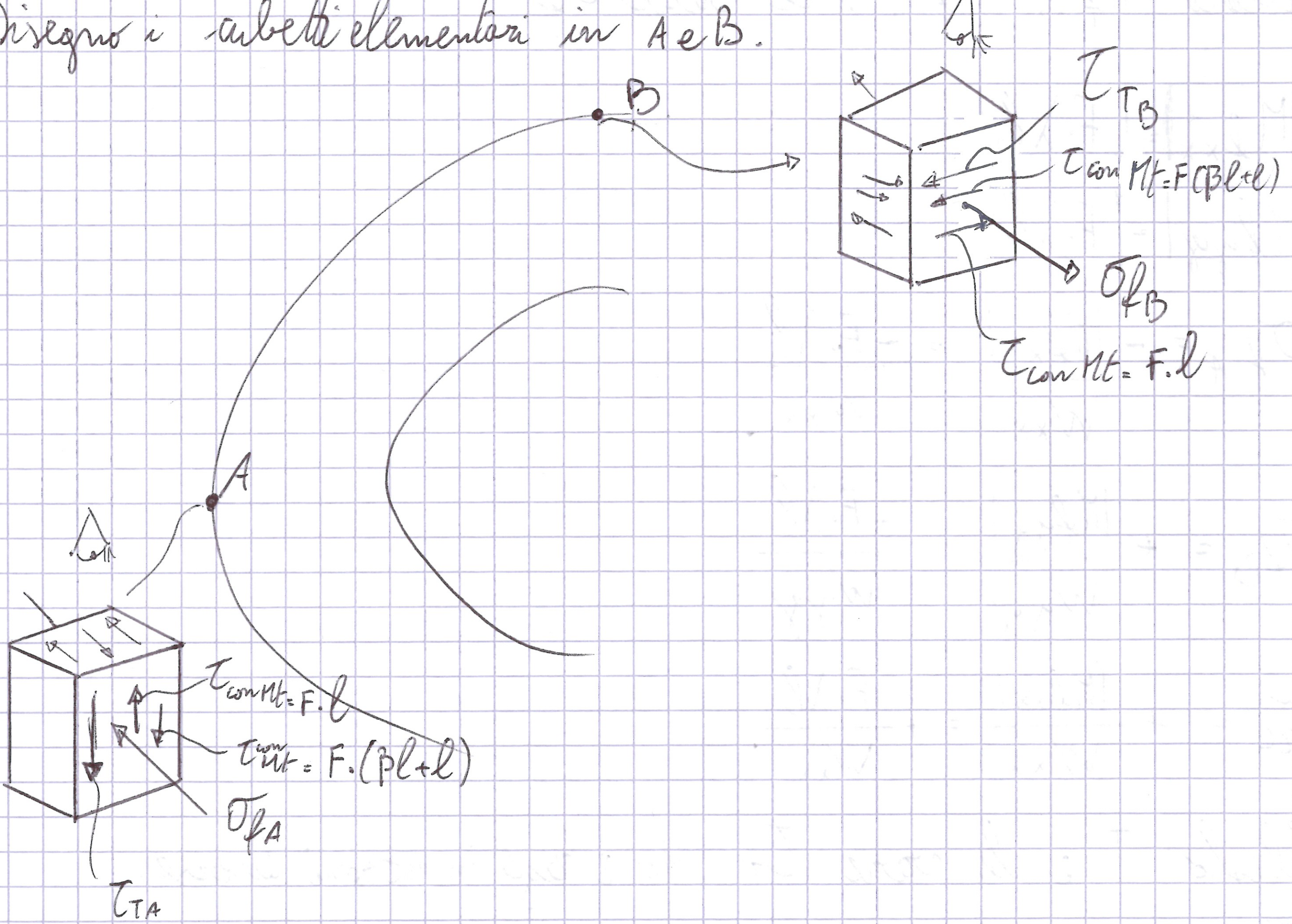
$$|\tau_{T_C}| = \frac{|T_{yy}|}{A} \cdot \frac{4}{3} \cdot \left(1 + \frac{1}{\alpha + \frac{1}{\alpha}}\right)$$

Calcolo M_t e le varie τ_{Mt}

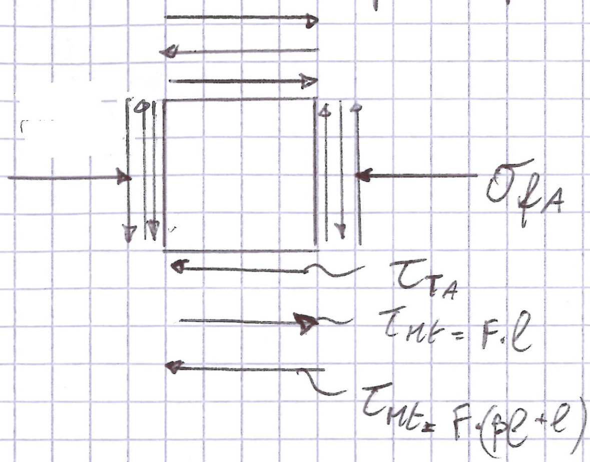
$|M_t| = |(F \cdot l) - F \cdot (\beta l + l)|$ ho 2 contributi, opposti tra loro, ma con intensità generalmente diversa tra loro.

$$|\tau_{Mt_A}| = |\tau_{Mt_B}| = |\tau_{Mt_C}| = \frac{|M_t|}{W_p}$$

Disegno i cubetti elementari in A e B.

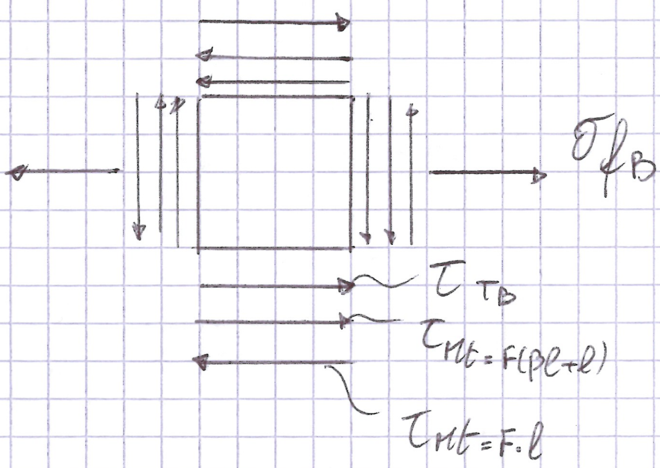


Calcolo le tensioni principali per A. Vedo il cubo dall'alto.



$$\sigma_{1-2_A}=\frac{\sigma_{f_A}}{2}\pm\sqrt{\frac{\sigma_{f_A}^2}{4}+\left(\tau_{T_A}+\tau_{Mt=F\cdot(\beta\ell+\ell)}-\tau_{Mt=F\cdot\ell}\right)^2}$$

Calcolo le tensioni principali per B. Vedo il cubo dall'alto.



$$\sigma_{1-2_B}=\frac{\sigma_{f_B}}{2}\pm\sqrt{\frac{\sigma_{f_B}^2}{4}+\left(\tau_{T_B}+\tau_{Mt=F\cdot(\beta\ell+\ell)}-\tau_{Mt=F\cdot\ell}\right)^2}$$